

## NOTE

### Improved Data Set for the Herzberg Band Systems of $^{16}\text{O}_2$

In two recent papers (1, 2), results were given for the Herzberg band systems I, II, and III of  $^{16}\text{O}_2$ , recorded with a high-resolution Fourier transform spectrometer coupled to a long-path absorption cell. From a set of spectra obtained under various pressure and path conditions (Table 1 of 1), it was possible to extend the analyses of previous works (see 1 and references therein), to determine the oscillator strengths of the bands, and to calculate the transition moments (2) for the three transitions ( $A^3\Sigma_u^+-X^3\Sigma_g^-$ ,  $c^1\Sigma_u^--X^3\Sigma_g^-$ ,  $A'^3\Delta_u-X^3\Sigma_g^-$ ) corresponding to the Herzberg band systems.

Since then, a reexamination of our spectra with the best S/N ratios showed us the presence of persistent lines, some of which could be assigned to the Herzberg bands. These lines are weak, but their contribution to the ultraviolet absorption cannot be neglected in atmospheric measurements involving long absorption paths. To improve the sensitivity of the detection of gas traces in the atmosphere by subtracting the contribution of the main constituents from the *in-situ* spectra, maximum information on the spectroscopy of these constituents is required. Therefore it is important to include the new data in the set already known for oxygen.

Two spectra, obtained with 4096 cumulated scans (path of 402 m, and oxygen pressure of 250 Torr) and 5120 cumulated scans (path of 202 m, and oxygen pressure of 510 Torr), have been particularly revisited. The extrapolation of the line positions from the known data and the simultaneous examination of the two spectra allowed us to extend the analyses, generally at one or two unit higher rotational numbers in most of the branches; series of lines could be also assigned to branches ( $Q_{R_{33}}$ ,  $P_{Q_{32}}$ ,  $Q_{R_{23}}$ , and  $Q_{R_{13}}$ ) observed for the first time in the  $A'-X$  transition. As a whole, 491 new observed lines have been identified and 786 new rotational transitions have been assigned; nevertheless, about 250 remaining lines spread over the whole region (240–300 nm) of the spectrum could not be combined with the known transitions of  $^{16}\text{O}_2$ . Their positions and their intensities have been carefully recapitulated since these lines also contribute to the atmospheric absorption.

The list of the wavenumbers and intensities for all the assigned lines of oxygen in the Herzberg band region together with the unidentified lines can be obtained in this journal's electronic data depository, available on the World Wide Web. Additional tables are given for the molecular parameters of the A, c, and A' states calculated by fitting all the lines in the bands of the three transitions (A–X, c–X, A'–X, respectively), and for the transition moments. They are essential to the calculation of simulated oxygen spectra at different pressures.

## REFERENCES

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